TRON DF56.0
User manual

UK

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INTRODUCTION

This manual describes how to use the **DF56.0** modems.

Two modems connect two computers over a longer distance through a telephone line. Data can be received from or sent to the other computer. In this way, contact can also be made with an external data base. Information in this data base can be read and if necessary, it can be received.

This manual does not describe all steps that are necessary for data communication. The fact is, a number of transactions depend on the communication program that is used.

The manual is mainly meant to give a survey of the application possibilities of the **TRON DF** modems.

Who should read this manual ?

In this manual both the novice and the experienced user will find the information that he or she needs. For openers, chapter 1 is interesting for the first category. In this chapter general information is given about data communication and the use of a modem. The alphabetical description of the modem commands and the S registers (chapter 3 and 4) can be used as a reference book by both kinds of users.

Manual conventions

In the first chapter, data communication in general is explained. The second chapter describes the **TRON DF** desk model, the installation and putting the modem into use. Chapter three explains the modem commands. In chapter four, the S registers are discussed. Finally, chapter five gives an enumeration of the specific possibilities of the **TRON DF** modems.

In the appendices, background information is provided about a number of aspects, such as the technical specifications and the ASCII table. Naturally, the keyword list is an essential element of the manual.

The equipment has been approved according to resolution 98/482/EC for European single terminal connection to the public telephone network (PSTN). Because of minor differences between the PSTNs in different countries, this approval does not it itself guarantee a correct link with every PSTN connection point.

If you have any problems you should first contact your supplier.

NOTE: The manufacturer should ensure that the retailer and user of the equipment are aware of the above.

We do wish you lots of good connection with your TRON DF56.0

1 DATACOMMUNICATION

Computers can exchange (communicate) data (information) through a disk (floppy disk), through the connection of two serial ports, or through a network.

With the use of a modem, information is exchanged through the serial (or RS232) port.

1.1 Data bits, parity bits and speed

The RS232 standard describes how serial information is processed (passed on). In the computer, bits are processed simultaneously (parallel). Through the serial port, these bits are passed on one by one.

A couple of extra bits are sent along to assure that the receiving side can interpret them correctly. These bits are: a starting bit, the so-called parity bit (for error detection), and one or two stop bits. Together this forms a frame or character.

The two frames used most frequently for standard asynchronous communication are built up as follows:

1 start bit + 7 data bits + 1 parity bit + 1 stop bit or
1 start bit + 8 data bits + 1 stop bit

Beside the frame (character), the speed (baudrate) has to be set as well. The speed is expressed in Bits per Second (bps) or baud. Although there is a difference, these concepts are often used alternately. However, the indication ‘bps’ is always correct. Therefore, at V21 300 bps is the same as 300 baud. However, at V22bis a 2400 bps

connection is 600 baud. This is the case since per modulation (per baud), 4 bits are transferred simultaneously.

Possible speeds are: 75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 21600, 24000, 26400, 28800, 31200 and from 33600 up to 56000 bps.

When the data bits, parity bits, and speed have been set on both sides (sender and receiver), a connection can be established. Information can then be exchanged.

1.2 ASCII and the meaning of data

For the interpretation of received data, with most programs the ASCII table is used as a basis, in which each character has a unique bit combination. Sending text is relatively simple if both sides stick to this ASCII table.

Control characters are also included in the ASCII table. These are characters that do not represent characters or punctuation, but commands that may be followed by a certain action. An example of such a command is the ASCII character with the number 12 (Form Feed). This command assures that the printer moves to the next page.

This way, we also have characters which are used in data communication to indicate the beginning of a text block that we would like to send (char.2 STX: Start of text) or its end (char.3 ETX: End of Text). There are also characters, that inform the sender whether a text block was received correctly or not. This is done by character 6 (ACK: acknowledge) and 21 (NAK: negative acknowledge).

Sending computer programs instead of text is a little more complicated. After all, in a program each combination of data bits can occur and therefore also a combination that represents a control character. For each (type of) computer, the meanings of these combinations can be different. Most of the time, sending programs between different kinds of computers therefore requires a conversion at the sender and the receiver. If a conversion is used, it is even possible to send programs as text. Among others, this is done with Prestel and Teletel.

1.3 Function of the modem

We have seen that computers can exchange information through the serial port if both sides stick to a number of agreements. With a direct connection of two serial ports, it is only possible to bridge a limited distance (about 50 feet or 15 metres). The telephone network is used to bridge a greater distance. It is an existing infrastructure by which connections can be established all over the world. However, the telephone network is not suitable to process digital signals. Only analog signals (voice) can be processed correctly. Technically this can be solved as follows: the sender converts (modulates) the digital signals of the serial port into analog signals that are suitable for the telephone line. The receiver converts (demodulates) these analog signals again into digital ones and sends these to its serial port.

We call the device that can carry out these conversions a modem (MOdulator / DEModulator). A modem's function is therefore the coversion of digital (RS232C) into analog signals and vice versa.

However, with communication through a telephone line, a number of additional agreements are necessary:

1. It must be possible to establish a connection automatically (see paragraph 1.4)
2. The analog signal has to meet international agreements (see paragraph 1.5)

1.4 Setting up a connection

Building up a data connection through the telephone line can be done in two different ways.

1. The easiest way is when first a normal (voice) connection is established and subsequently is switched to a data connection (communication through the modems) by hand.
2. A faster way is when the modem itself is capable to establish the connection (dialling a number) and the other modem can answer independently. This is called auto dial and auto answer respectively.

Through a communication program, the auto dial modem receives a command to dial a telephone number. When the other modem is in the auto answer mode, this one detects that the bell rings and it picks up the receiver, after which a data connection is established.

1.5 Transmission techniques

Modems for lower communication speeds (until 1200 bps) all work according to the same principle: the so-called FSK modulation (Frequency Shift Keying). FSK works according to the method of converting a digital signal, existing of zeros and ones, into tones.

The '0' has another pitch (frequency) than the '1'. The receiving modem recognises the two pitches that it receives and for its part, it forms again a digital signal out of the analog signal.

During the connection, the sender always transmits a tone. When at ease, the signal of the serial port is '1' and the modem sends out the corresponding tone. We call this tone the CARRIER. The receiving modem knows that there is a connection with another modem by detecting this carrier.

With FSK modulation, the pitch of the transmitted signal always has to be higher than the speed of the transmitted data. Therefore, for a 300 bps connection, both tones have to be higher than 300 Hz (for example 1000 and 1200 Hz).

The telephone line is capable to pass on tones correctly until about 3000 Hz. This makes communication in both directions possible: the fact is, the receiver sends back other tones, for example tones of 1700 and 1900 Hz. As a result of this, the receiver is also sender in the other direction. This is called a full duplex connection.

It may be clear that for speeds higher then 2400 bps, it is not possible any more to generate a '0' and a '1' at a far enough distance from each other twice within the 3000 Hz of the telephone line. Also at 1200 bps this is already a problem.

In this case, there are three possibilities:

1. communication only in one direction: half duplex; at certain moments, a switch can be made so that information can be sent back too
2. communication backwards (the other way around) at a lower speed, the so-called backchannel. The latter is used a lot if much more information has to be sent in one direction than in the other direction
3. modulation according to a technique, at which several bits are sent at the same time

A half duplex connection with backchannel works as follows: If the one modem sends a 1200 bps signal with tones of 1300 and 2100 Hz, the other modem can send back a 75 bps signal with tones of 390 and 450 Hz.

Other modulation methods are used for a higher communication speed (1200 bps and up). Thus, at V22 (1200 bps full duplex), Quadrature Phase Shift Keying (QPSK) is used, at V22bis (2400 bps full duplex) Quadrature Amplitude Modulation (QAM), and at V32bis, V.34 (33600 bps full duplex) Trellis Coded Modulation (TCM).

1.6 Originate and answer

It is necessary to make agreements which modem uses which tone sets. For this purpose, the terms 'originate' and 'answer' are used. The modem that builds up the connection, sticks to the originate tones, the other one uses the answer tones. The originate modem sends as agreed with the low tones and the answer modem with the high tones.

For a backchannel connection, this means that the originate modem sends with the low baudrate and the answer modem with the high baudrate.

With a full duplex connection, both modems use the same baudrate and the tones for '0' and '1' are different.

1.7 The modem is transparent

We have seen how the two computers can be connected with each other and how the communication takes place. When a connection has been established, it is possible to send data between both computers. The modem only serves to establish the connection, after that they are fully transparent.

Nevertheless, sometimes communication can go wrong.

If you get 'strange' characters on the screen during a connection with a data base, the setting of the communication program will have to be changed, for example the number of data bits, the parity bit, or the baudrate. This problem is not caused by the modem. The modem functions as a hatch.

2 INSTALLATION OF THE MODEM

In this chapter, a description of the modem is given, the installation procedure will be explained and finally, it will be discussed how a connection can be built up step by step.

2.1 Description TRON DF56.0

At the front of the modem there are a number of lights that indicate (from the top down): the speed of the connection as well as the DTR level, TxD, RxD, CARRIER, On-line, AUTO ANSWER and POWER. At the bottom of the front, the Softkey is located.

The speed LEDs have two functions:

1. When the modem is connected to another modem, they indicate the speed at which communication takes place.
2. They indicate the DTR (Data Terminal Ready) status. This signal is active when one of the speed LEDs is on.

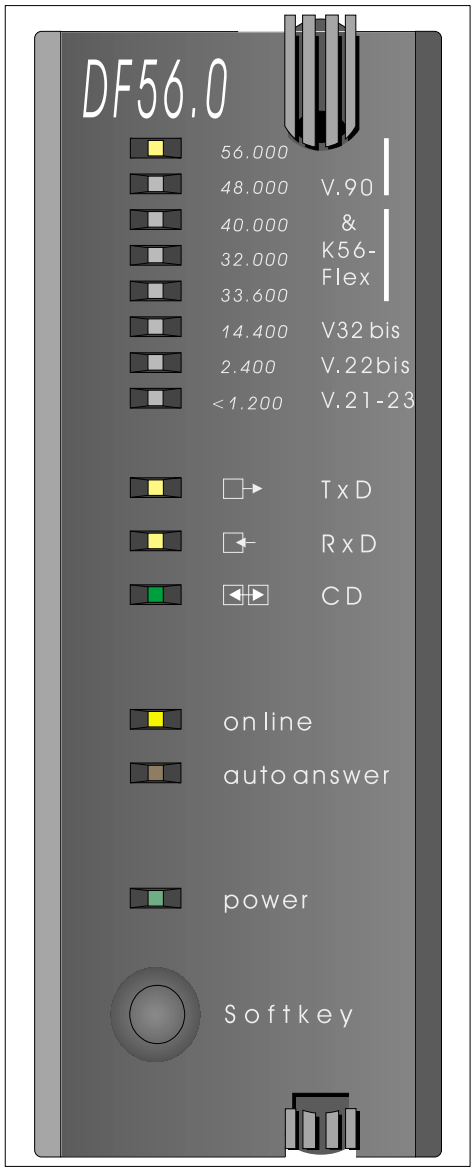


Figure 1. Front of the DF56.0

The transmission LEDs show the sent (TxD) and received (RxD) data on the serial port. The third one, the carrier LED (CD), indicates that there is a connection with a modem, at which red indicates a non-corrected connection. When the CD LED is green a reliable connection is established. That is to say: a connection at which possible errors are corrected. This can be V42 (LAPM), V42bis or MNP 2, 3, 4, or 5 connection. With a MNP5 or V42bis connection, the data will be compressed also.

The telephone line status is indicated by two LEDs: On-line (OL) and Auto Answer (AA). OL indicates that the modem has been connected with the telephone line. Then, the telephone is disconnected.

The AA LED has two different functions:

1. off-line: the AA LED being continuously on means that the modem is in the auto answer mode. The modem switches to on-line as soon as a RING signal is detected. The AA LED blinks to indicate this.
2. on-line: a LED being on means that the modem is in the answer mode. If the LED is off, then the modem is in originate mode.

The power LED is on when the modem is switched on.

At the back of the modem there are connections (from the top down) for the telephone line, the telephone, the computer, and the mains lead.

Beside that, the type number and a sticker with the approval number, and the ring equivalence number are attached.

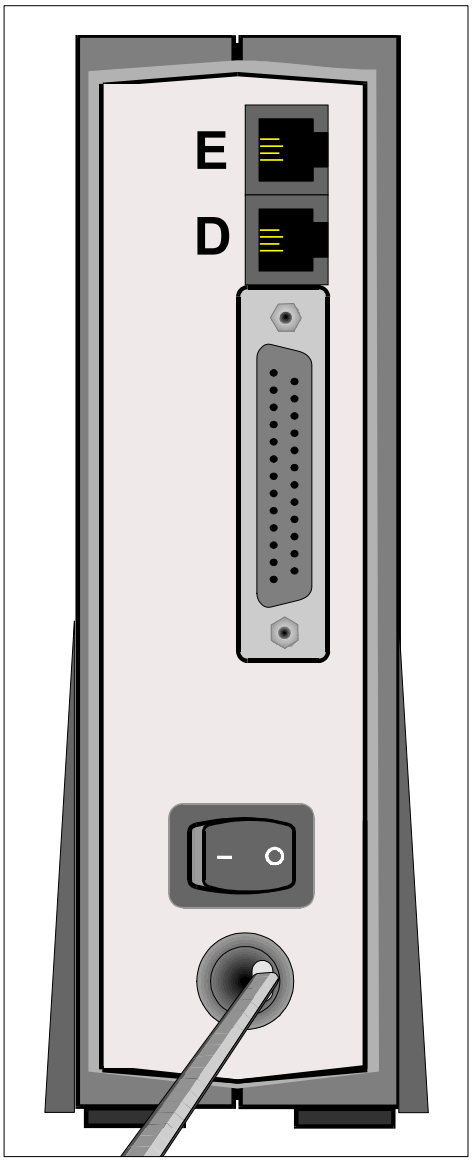


Figure 2. Backside of the DF56.0

2.2 What else do you need?

Apart from your **TRON DF56.0** you need:

1. a telephone connection
2. a computer or terminal with a serial port
3. a communication program (terminal and/or fax program)
4. a telephone number and other data (speed, parity, etc.) of the data base that you want to contact
5. a serial cable
6. a wall socket

2.3 Connection of the TRON DF56.0

To connect the modem:

1. Connect the serial ports of the modem and the computer with each other.
2. Take the cable with the feed-through plug and click the telejack (on the other end of the cable) into the connector of the modem (figure 2, point e). Put the feed-through plug into the telephone socket and the telephone plug into the feed-through plug. If the extra connector is available (figure 2, point d), connect the telephone here. In this case, the modem can be connected with the telephone line through a normal plug.
3. Put the mains plug of the modem into the wall socket.
4. Switch the modem on by turning the switch at the back into the '1' position. Now the green power LED is on.
5. After being switched on, the modem will execute an extended self-test. This takes a few seconds.

2.4 Establishment of a data connection

In this paragraph, we will go over the actions, which are necessary to establish a data connection. Here the communication software is discussed roughly. The fact is, each package has its own command structure.

1. Start the communication program.
2. Assure that the software controls the serial port to which the modem is connected.
3. Select the communication speed (baudrate), number of data bits and the parity. For example: 57600 bps, 8 bits, no parity.
4. Assure that the program is in the 'terminal mode', so that typed in characters can be sent to the modem. The modem echoes the characters back to the screen.
5. Type subsequently: ***AT <Enter>***

   On the screen appears: AT
   OK

NOTE: If the characters appear on the screen twice, the echo has to be switched off in the communication program (ATE0).

With the **TRON DF56.0** model, the speed LEDs indicate the baudrate. If none of the LEDs is on, the DTR signal is not active. This can be changed with the communication program. If this is not possible, the modem can simulate that DTR is active. This is done with the AT&D0 command.

NOTE: Use this method only if you know for sure that the software does not activate DTR. Almost each program does so, so that at first the cause must be found somewhere else, for example at the cable.

6. Dial a telephone number with the command ATD

   Type for example: ATD00 31 181698399
   The On-line LED is turned on and the modem dials the number. Through the built-in loudspeaker, you can hear the connection building up.

   a. If a connection has been established, one or two of the following messages appear on the screen:

CONNECT	: 300 bps V21 connection
CONNECT 1200	: 1200 bps V22 connection

CONNECT 2400	: 2400 bps V22bis connection
CONNECT 75TX/1200RX	: 1200/75 bps V23 connection
CONNECT 14400	: 14400 bps V32bis connection
CONNECT 33600	: 33600 bps V34 connection
CONNECT 48000	: 48000 bps V34 connection
COMPRESSION: CLASS5	: MNP5 connection
COMPRESSION: V42bis	: V42bis connection
COMPRESSION: NONE	: Connection without compression
FAX	: FAX connection
DATA	: Data connection

It is possible that a connection has been established at another communication speed than you selected. In that case, you have to set the communication program at the new speed. Some programs do this automatically. If the speed converter of the modem is on (default), the communication program does not have to be set again since the speed to the computer remains the same.
The Carrier LED (CD) is on to indicate that there is a data connection, at which green is a safe, error-free connection.

b. If it is not possible to establish a connection, one of the following messages appears on the screen:

ERROR	You made a typing error.
NO DIALTONE	The modem does not recognise a dial tone. Therefore, it is not possible to call. Check whether the modem is connected with the telephone network.
BUSY	The telephone number that you dialled, is busy.
NO CARRIER	The called modem does not have the speed that was selected. Another explanation is that there is no modem available at the dialled number.
NO ANSWER	There is no response.

7. Terminate the connection. There are three possibilities to do so:

a. Ask the called system base to disconnect.

b. Use the hang-up command of the communication program.

c. Ask the modem to end the connection.

To do this use this command sequence:

Wait 1 second	
Type:	**+++**
On the screen appears:	OK
Type after that:	***ATH <Enter>***
On the screen appears:	NO CARRIER

Important

The maximum speed between two DF56.0 modems is always 33600 bps using V34. Higher line speeds using V90 or K56flex can only be obtained by calling to a CSM (Central Side Modem). This is a device connected to a digital ISDN line. Most Internet Service Providers have such equipment.

3 MODEM COMMANDS

This chapter describes the AT commands used for setting up and operating the **TRON DF56.0**.

3.1 Using the AT commands

Most modems and communications software uses the AT command set. Some modem manufacturers add their own commands to the AT command set. Consequently there is no longer one standard. A distinction is made between the 'Standard AT' and 'Extended AT' command sets. If you are using Windows 95/98, it is generally not important to know the AT commands.

A number of reasons can be given for the differences between modem commands. By different inspection requirements, certain commands or settings are not allowed in some countries. There are also differences between American and European transmission standards (Bell versus CCITT).

The **TRON DF56.0** recognizes both the Standard and the Extended AT command set. Apart from these, a number of specific commands were added.

Moreover, for the use of a fax the modem uses the AT+F commands. These commands are not discussed in the manual, since they work together with specific software only.

3.2 Command mode and data mode

The modem knows two modes:

1. **Command mode**

   In this mode, the modem executes commands that are typed in through the terminal. The modem is in the command mode when it is not on-line or, in case of a data connection, when it was switched to the command mode through the escape sequence.

2. **Data mode**

   The modem is transparent, which means that information being exchanged through

both modems remains unchanged. With a data connection, the modem is in the data mode most of the time. If the modem has to execute a command, this can only be done from the command mode. During a connection, the modem can be switched to the command mode through the escape sequence.

Escape sequence:

wait 1 second	
type:	**+++**
after 1 second:	OK

The modem is now in the command mode.
Use the command “ATO” to make the modem return to the data mode.

3.3 Command line format

A command line begins with the letters AT, from the English word ATtention. The letters AT should both be in either upper case or lower case. The command line ends with <ENTER>. One or more commands can be given on each command line. A command line may not contain more than 54 characters. You cannot type more than 54 characters on one line.

NOTE: The modem remembers the last command line. To repeat it, type: A/ (without <ENTER>).

For clarity commands must be separated from each other by spaces. The spaces count towards the total length of the command line.

A command is sometimes followed by a parameter (number). If the parameter is 0, it may be omitted. For example: ATE0 is the same as ATE.

A command line is not executed if CNTRL-X (18H) is received by the modem.

From the letters AT at the beginning of the command line the modem identifies the baud rate and parity of the terminal and configures itself accordingly. The rates which are recognised automatically are 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200 and 320,400 bps.

The modem can recognise data formats with 7-bit or 8-bit characters, with even, odd or no parity bit and with one stopbit.

3.4 Overview of the AT commands

The modem responds to the following commands. In section 3.5, *Explanation of the AT commands*, from page 20, the AT commands are described with the associated parameters.

A/	Repeat last command	*20*
=x	Write to the selected S register	20
?	List contents of the selected S register	20
A	Answer	21
B	CCITT or RING	21
D	Dial	24
E	Echo	27
H	On hook/off hook	28
I	Identification	28
L	Loudspeaker volume	31
K	Voice/Data switch	31
M	Loudspeaker (Monitor) control	32
N	Automatic line speed detection	36
O	On line data mode (Originate)	36
P	Pulse dialling	36
Q	Disable response (Quiet	37
S	Read/write S registers	38
T	Select tone dialling (DTMF)	39
V	Terse/verbose response	39
W	Extended response	42
X	Dial and busy tone recognition + responses	42
Y	Long space disconnect	43
Z	Reset and configure modem	44
'+++'	Escape code sequence	44
'**'**	Remote configuration	44
&C	Carrier Detect (DCD) status	22
&D	Data Terminal Ready (DTR) status	25

&F	Factory default settings	27
&G	Select guard tone	27
&J	Select calling back through line 1 or 2 (optional)	29
&K	Flow control	29
&M	Synchrone mode	32
&Q	Synchronous/asynchronous mode	37
&R	RTS/CTS control	38
&S	Data Set Ready (DSR) control	38
&T	Test and diagnosis	39
&V	Show configuration	40
&V1	Show data from most recent connection	41
&W	Store current configuration	42
&X	Synchronous clock	43
&Y	Modem configuration after switching on	43
&Z	Store a telephone number in memory	44
%C	Select data compression mode	22
%E	Enable/disable 'auto-retrain'	27
%F	Split baud rate direction selection	27
%K	Programme softkey	29
%Q	Line signal quality	37
***A**	Auto-dailback on/of	21
***C**	Remote configuration password	23
***H**	Negotiation speed MNP10	28
***L**	List auto-dialback numbers	32
***P**	Store auto-dialback numbers	37
***X**	Exit remote configuration	43
\A	Select maximum MNP block size	21
\B	Send a break signal to remote	22
\D	Dumb mode	26
\G	Modem-modem flow control (Xon/Xoff)	28

\K	Break control	30
\N	Error correction on/off	36
\S	List current configuration	38
\V	Number of signal lines for connection	41
#CID	Select Caller Identification	23
-K	MNP extended services MNP10	31
+MS	Modulation Selection	33
)M	Adjust send level MNP10	35

3.5 Explanation of the AT commands

In this section the AT commands are described in alphabetical order. You will find a list of all the commands in the previous section. For each command the factory default setting is given. Generally there is no need to change the default setting.

A/ **Repeat last command**

The modem responds to this command as if the previous command had been entered again from the terminal. This command must not be preceded by AT or be followed by <ENTER>.

AT**=x** **Set S register**

This command causes the value x to be assigned to the specified S register. You can also use the command ATS to set the S register. For more information see ATS.

AT**?** **Read S register**

This command displays the setting of the selected S register. You can use the command AT= to set the S register. For more information see ATS.

AT**A** **Answers**

The command ATA puts the modem on line and activates the answer mode. If no carrier is detected during the period specified in register S7 (default 60 seconds), the modem is switched off line.

Any character entered while the connection is being established immediately clears the attempted connection.

AT**A** **Maximum MNP block size**

The MNP error correction mode is activated and the modem operates with the set maximum block size as shown in the following table.

0 - 64 characters

1 - 128 characters (default)

2 - 192 characters

3 - 256 characters

AT***A** **Auto-dailback on/of**

This command is used to switch Auto-dailback on or of.

0 - Auto-dailback is off (default)

1 - Auto-dailback is on

See also the special chapter on Auto-dailback.

AT**B** **CCITT/ RING modulation**

With this command, the modem uses CCITT- or RING modulation for connections with a speed of 300 or 1200 bps, depending on the parameter entered. The default setting CCITT is used for all other speeds.

0 - CCITT modulation (default

1 - RING modulation

AT**\B** **Break signal to other modem**

With this command, during a connection without error correction the modem sends a break signal to the other modem, the length of which depends on the specified parameters. During a connection with error correction, the break signal is sent by the active error correction protocol, but without an indication of the length. If there is no connection or FAX mode is active, the ERROR message is issued.

1 - 9 Length of the break signal in units of 100 ms (default = 3).

(This only applies to connections without error correction.)

AT**%C** **Data compression mode**

This command selects the MNP5 and/or V42bis mode for data compression. This mode can only be used with a connection with error correction.

0 - data compression off

1 - MNP5 data compression on

2 - V42bis data compression on

3 - V42bis and MNP5 on, automatic selection (default)

AT**&C** **Carrier Detect (DCD) status**

Controls the function of the DCD signal.

0 - DCD is always on (not visible on LED)

1 -DCD follows the status of the carrier on the line (default)

AT**&C** **DCD status (carrier detect)**

This command is used to set the operation of DCD.

0 - DCD is always on (not visible on LED indicator)

1 - DCD monitors the carrier status on the line (default)

AT***C** **Remote configuration Password (optional)**

This command stores a password in memory. By entering the **AT*C** command, the modem shows the text 'ENTER PASSWORD', after which a new password can be entered. The password given by the remote modem must correspond with the password stored in the local modem. The password must be between 6 and 12 characters of length and it may only include alphanumerical characters.

The factory setting for the password is **SECRET**.

See also the AT*X command and section 5.5, *Remote configuration (optional)*.

AT**#CID** **Dutch Calling Line Identification**

The **DF56.0** supports Dutch Calling Line Identification according to T11-12.

This option indicates who is calling before answering.An extra subscription will have to be paid for this option to the relevant telephone company. The number is displayed between the first and second 'RING' (see example). The command is as follows:

AT#CID=n

0 - Switch Caller Line Identification off. (default)

1 - Switch Caller Line Identification on with standard format.

2 - Switch Caller Line Identification on without standard format.

Example 1:

```
AT#CID=1                    ; select with standard format
OK
RING
NMBR = 0724749361           ; incoming call
                            ; number calling is 072-4749361
RING
```

Example 2:
This example shows the non-standard format of CLI. The string between the first and second RING is displayed in ASCII hexadecimal code. Opening and closing characters are added. The opening character is a 'D' (hex 44), the closing character is a 'C' (hex 43).

```
AT#CID=2                          ; select non-standard format
OK
RING
443035333934363238303743          ; incoming call
                                  ; number calling is 053-9462807
```

AT**D** **Dialling**

This puts the modem on line and dials the number following the ATD command.

If you do not specify a telephone number, the modem will be put on line and will try to establish a connection in originate mode.

The modem waits for the time specified in register S7 (default 60 seconds) for a carrier to establish the connection. If the connection has not been fully established within that time, the modem goes off line (hangs up) and you will see the error message "NO CARRIER".

The approved telephone number parameters are given below. Dots may be used to make things clear. Brackets, hyphens, and spaces are ignored.

0-9	Numbers 0 to 9
*	The asterisk symbol (only with tone dialling)
#	The hash symbol (only with tone dialling)
A-D	The DTMF letters A to D
P	Select pulse dialling
T	Select tone dialling
S=n	Dial a number from the telephone list (see AT&Z)
!	Flash. The modem is switched off line during the time set in register S29.

W Wait for a dialling tone. The modem waits for a dialling tone before the requested number is dialled. If no dialling tone is detected within the time specified in register S6, the modem is switched off line and you will see the error message "NO DIALTONE".

@ Wait for silence: The modem waits for silence on the line for at least 5 seconds before the next dial command is carried out. If the modem does not detect that 5-second silence during the time specified in register S7, dialling is interrupted and you will see the error message "NO ANSWER". If detection of the engaged tone is switched on, you will get the message "BUSY". If the modem detects an answer tone before the waiting time has expired, the connection will be established.

, Dial pause: the modem pauses during the time set in register S8 before the next number is dialled.

L Repeat last number: the modem repeats the last number dialled.

; Return to command mode: this command after entry of the telephone number will return the **TRON DF56.0** to command mode after the commands before the character ';' have been processed. You can then enter extra AT commands while the modem is on line. The extra AT commands may also be entered on the original command line after the character ';'. The **TRON DF56.0** only continues dialling if an extra command without the character ';' is entered. You can then interrupt the dialling with the ATH command.

( ), **-**, **<space>** May only be used to make things clear. The modem ignores these characters

AT**&D** **DTR status (Data Terminal Ready)**

Determines the response of the modem if DTR is disabled.

0 - If the DTR signal is disabled, the default settings of &Q are affected as follows:

&Q0,&Q5,&Q6: The DTR signal is ignored and the modem works as if the signal were enabled. This makes it possible to work with terminals with no DTR signal.

&Q1,&Q4: When the DTR signal is disabled, the modem is switched off line. This will not affect auto-answer.

&Q2,&Q3: When the DTR signal is disabled, the modem is switched off line. Auto-answer is not possible.

1 - If the DTR signal is disabled, the default settings of &Q are affected as follows:

&Q0.&Q1,&Q4, &Q5,&Q6. When the DTR signal is disabled, the modem responds as if an asychnonous escape code has been received. The modem returns to the asynchronous command mode without disconnecting.

&Q2,A&3. When the DTR signal is disabled, the modem is switched off line. Auto-answer is not possible.

2 - When the DTR signal is disabled the modem is switched off line and auto-answer is not possible. This is independent of the &Q setting (default).

3 - If the DTR signal is disabled, the default settings of &Q are affected as follows:

&Q0,&Q1,&Q4, &Q5,&Q6. When the DTR signal is disabled, a soft reset of the modem is performed as would be done with the ATZ command. The AT&Y setting determines which profile is loaded.

&Q2,&Q3. When the DTR signal is disabled, the modem is switched off line. Auto-answer is not possible.

The commands AT**&Q5** and AT**&Q6** have the same effect as AT**&Q0**.

AT**D** **Dumb mode**

Use this command to enable dumb-mode. When dumb-mode is enabled the modem does react to any characters from the serial port. AT-commands are not recognized and calls can not be aborted.

0 - Disable dumb-mode (default)

1 - Enable dumb-mode

If you want to make the dumb-mode a default setting you should use this command:

AT**\D1&W** <CR>

When you've issued this command there is only on way to disable dumb-mode:

Switch off your modem. Keep the softkey depressed while you switch on the modem again. Release the softkey after a view seconds, the default factory-settings are now active.

AT**E** **Local echo on/off**

The ATE command causes the characters that are entered to be displayed on the terminal as well.

0 - Display off

1 - Display on (default)

AT**%E** **Auto-retrain on/off**

0 - Auto-retrain off (default)

1 - Auto-retrain on

2 - Fall-back / Fall-forward on

3 - As %E1, but is interrupted more quickly with poor connections

AT**&F** **Factory default settings**

This command restores the modem's factory settings. These are given for each AT command and in the list of the S registers. The term default indicates the factory settings.

0 - Restore factory profile 0

1 - Restore factory profile 1

AT**&G** **Guard tone on/off**

This command switches use of the guard tone on or off.

0 - Guard tone off

1 - Idem

2 - 1800 Hz guard tone on (default)

AT**\G** **Modem-modem flow control (Xon/Xoff)**

Depending on the settings, the flow control between the modems is on or off. This is only applicable for non-error corrected connections since a connection with error correction has its own flow control.
See also AT**&K.**

0 - Modem-modem flow control off (default)

1 - Modem-modem flow control on

AT**H** **On hook/off hook**

0 - The modem goes off line and terminates any test (AT&T).

1 - If the modem is off line, it is put on line in command mode. The modem goes off line again after the time specified in S30.

2 - Select line 2. The modem starts to communicate through line 2. Line 1 is selected again in case of breaking off the connection. (For this, a Dual Line interface extension is required).

AT***H** **MNP10 negotiation speed**

This command is used to determine the line speed during negotiations between two MNP Class 10 modems. Communication then takes place at a higher speed.

0 - Negotiation at the highest supported speed (default)

1 - Negotiation at 1200 bps

AT**I** **Identification**

This command causes the modem to send the required information to the screen depending on the specified parameter.

0 - Product code

1,2 n/a

3 - Type of modem and version number of the software

AT**&J** **Select auto-dialback through line 1 or 2**

This command selects whether the dialback is done through line 1 or 2. This command will only function correctly with an installed Dual-line interface.

0 - Calling in and dialback through line 1

1 - Calling in through line 1, dialback through line 2 (default)

AT**K** **Voice/Data switch**

This command selects whether the connection can be terminated using the softkey. In combination with the AT**%K** command, the softkey can be programmed as a voice/data switch.

0 - Softkey has no function in the data mode

1 - Connection is terminated when the softkey is pressed in the data mode (default)

AT**%K** **Softkey**

Programmes the softkey. The commands following AT**%K** are allocated to the softkey. These are executed when the softkey is pressed during command mode. A maximum of 31 characters can be programmed (including spaces).

For example:

AT**%K D** Use as voice/data switch.

Programme the softkey with the command D (Dial). By pressing the softkey, the modem goes on-line and tries to establish a connection in originate mode.

AT**%K Z1** Activate stored profile 1.

AT**%K D067100** Dial 06-7100

See also ATK.

AT**&K** **Flow control**

This command is used to set the flow control of the modem/terminal.

0 - Flow control off

3 - RTS/CTS flow control on (default)

4 - Xon/Xoff flow control on

5 - Transparent Xon/Xoff flow control on

6 - Both Xon/Xoff and RTS/CTS flow control on

AT**K** **Break control**

The modem responds to a break signal received from the terminal (DTE), a remote modem or the command AT\B according to the specified parameters. If a break signal is received from the terminal and the modem is operating in data mode, the operation can be controlled with the following parameters:

0 - On line command mode; no break signal is sent

1 - The data buffers are cleared and a break signal is sent to the remote modem

2 - As 0

3 - A break signal is sent immediately to the remote modem

4 - As 0

5 - A break signal is sent to the remote modem with the data; processing takes place in the order of sending (default)

When the modem is in command mode during a connection, you can use the AT\B command to send break signals to the remote modem.

0 - The data buffers are cleared and a break signal is sent to the remote modem

1 - As 0

2 - A break signal is sent immediately to the remote modem

3 - As 2

4 - A break signal is sent to the remote modem with the data; processing takes place in the order of sending

5 - As 4 (default)

When a break signal is received from a remote modem, the following occurs:

0 - The data buffers are cleared and a break signal is sent to the terminal

1 - As 1

2 - A break signal is sent immediately to the terminal

3 - As 2

4 - A break signal is sent to the terminal with the data; processing takes place in the order of sending

5 - As 4 (default)

AT**K** **Voice/Data switch**

This command is used to convert a V42 LAPM connection to a MNP10 connection.

0 - Conversion off (default)

1 - Conversion on

AT**-K** **V42/MNP10 conversion**

This command is used to convert a V42 LAPM connection to a MNP10 connection.

0 - Conversion off (default)

1 - Conversion on

AT**L** **Loudspeaker volume**

The parameters for this command are used to set the modem loudspeaker volume.

0 - Volume low

1 - Volume low (default)

2 - Volume normal

3 - Volume high

N.B. Use the ATM command to switch off the loudspeaker

AT***L** **List of dialback entries with passwords**

The modem will display dialback entries with passwords and telephone numbers, that have been stored in the memory with AT*P.

Since there are as much as 100 entries, the modem will only show 20 entries at a time; the AT*L command can be extended with a number to show all entries:

AT*L0 show entry 0-19
AT*L1 show entry 20-39
AT*L2 show entry 40-59
AT*L3 show entry 60-79
AT*L4 show entry 80-99

See the AT***P** command and paragraph 5.4, *User access control and automatic dialback*.

AT**M** **Loudspeaker on/off**

0 - Loudspeaker off

1 - Loudspeaker off during reception of the carrier (default)

2 - Loudspeaker always on

3 - Loudspeaker off during dialling and connection, but *on* during establishment of the connection

AT**&M** **Synchronous mode**

This command determines the working of the (CT108) in cooperation with the AT&Q command.

0 - Direct asynchronous mode.
Attention: The command AT**&M0\N0** selects the normal buffered mode while the command AT**\N0&M0** selects the direct mode

1 - Selects synchronous connection mode and asynchronous off-line command mode

2 - The same as AT**&M1** with this difference that the modem starts to dial the number of memory 0 (See AT**&Z**) when DTR becomes active

3 - This is a synchronous mode at which DTR (CT108) functions as voice/data switch. The call is initiated manually while DTR is not active. When DTR becomes active, an originate or answer connection is built up (see S14 bit 7)

AT**+MS** **Modulation mode**

This command is used to select the modulation mode of a V34 modem, and may also be used to switch auto-mode on or off and set the lowest and highest possible line speed. The command has the following syntax:

+MS=<mod>,<automode>,<min_speed>,<max_speed>,<x-law>, <rb_signal>,<bc_speed><CR>

With this command a value for <mod> must be specified, the other parameters are optional. If a parameter is not specified, the current value is used.

Displaying the selected options:

The command AT+MS? causes the current modem settings to be displayed, for example:

12,1,300,56000,1,0,33600

The command AT+MS=? causes a list of possible values for the parameters to be displayed.

The modem responds as follows:

+MS=? (list of possible <mod>-values),(list of possible <automode>-values),(list of possible <min_speed>-values),(list of possible <max_speed>-values), (selection <x-law>),(selection <rb_signal>),(maximum bc_speed>)

Example: (0,1,2,3,9,10,11,12,64,69,74),(0,1),(300-33600),(300-56000),(0,1),(0,1),(300-33600)

Explanations of parameters:

<mod> A number indicating the preferred modulation (automode on) or the fixed modulation (automode off) for originate (dialling) or answer (auto-answer). The possible settings are:

<mod>	Modulation	Possible speeds (bps)	Note
0	V21	300	
1	V22	1200	
2	V22bis	2400 or 1200	
3	V23	1200	
9	V32	9600 or 4800	
10	V32bis	14400, 12000, 9600, 7200 or 4800	
11	V34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800 2400	Default setting
12	V90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000	
56	K56Flex	56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000	
64	Bell103	300	
69	Bell212	1200	

The modem may also automatically switch to another modulation (auto-mode).

<automode> The setting of <automode> automatically switches modulation negotiations according to V8 or V32bis annex A on or off. The possible settings are:

<automode>	Selected option	Note
0	Automode disabled	
1	Automode enabled using V.8 or V.32 Annex A	Default

The default value is 1, which enables automode. Note, however, there are modulations for which there is no automatic negotiation, e.g., Bell 212 (<mod> = 69).

<min_speed> Specifies the lowest speed at which the modem may establish a connection. The default value is 300 (bps)

<max_speed> Specifies the highest speed at which the modem may establish a connection. The default value is 56000 (bps)

<x-law> indicates whether mlaw or Alaw should be used during K56flex connections. Alaw is used in European countries. It is not recommended that you change this parameter.

<rb_signal> this parameter should not be changed.

<bc_speed> sets the maximum backchannel-speed used during V90 and K56flex connections.

AT**)M** **Adjust send level (MNP10)**

This command allows the modem to adjust the send level automatically during an MNP10 connection.

0 - Standard send level during MNP10 connections (default)

1 - Automatic adjustment of send level during MNP10 connections

AT**N** **Automatic line speed detection**

0 - Automatic line speed detection disabled. The connection is established according to the contents of register S37

1 - Automatic line speed detection enabled. This setting is the same as ATF0 (default).

Also see the AT**+MS** command.

AT**\N** **Error correction on/off**

This command determines whether or not error correction is performed during a connection. There are two protocols for a connection with error correction, namely MNP4 and V42 LAPM.

0 - Only connections without error correction. Interspeeder on. Forces AT&Q6.

1 - This parameter puts the external model into direct mode (AT&Q0). The internal model works with this parameter as with 0.

2 - Only connections with error correction. Forces AT&Q5, S36=4, S48=7.

3 - Automatic selection between error correction yes/no. Connections with error correction are preferred, but switching to normal connections is possible. Forces AT&Q5, S36=7, S48=7 (default).

4 - V42 LAPM connections only. Forces AT&Q5, S48=0.

5 - MNP4 connections only. Forces AT&Q5, S36=4, S48=128. Use this setting with Remote Configuration (see AT*R).

AT**O** **On line data mode (Originate)**

This command causes the modem to switch from on line command mode to on line data mode. If the modem is in off line command mode, you will receive the message ERROR. With the parameter 1 a retrain is performed before the modem switches back to on line data mode.

AT**P** **Pulse dialling**

Pulse dialling is not supported. This AT-command is still executable for compatibility reasons.

AT***P** **Programme dialback entries**

Save or delete an dialback entry with password and, optionally, a telephone number. The dialback entry is directly stored in permanent memory. The AT**&W** command is NOT neccesary to store an entry.

Syntax:

AT*Pn: <access code>[:telephone number]
at which n=0-99

The password must be at least 5 characters, and at the most 8 characters of length. The telephone number may be 16 characters of length at the most. A maximum of 100 dialback entries can be entered.
Entry of the telephone number is optional. If omitted, the modem will perform a password check only. If the password checks the modem will establish a connection immediately.

(See paragraph 5.4, *User access control and automatic dialback* and the AT***L** command).

AT**Q** **Response on/off (Quiet)**

This command determines whether or not the result codes are sent to the terminal.

0 - Result code on (default)

1 - Result code off

AT**%Q** **Line signal quality**

This command is used to monitor line quality. Values between 000 and 016 correspond to a good line quality. Values between 017 and 127 indicate poor quality. The line is monitored constantly when the modem is on line. When command AT%E1 is activated and the signal value is higher than 016, a retrain is carried out.

AT**&Q** **Synchronous/asynchronous mode**

This command is an extension of the command **&M** which is used in combination with registers S36 and S48 to monitor the permitted connection modes.

0 tot 3 - See AT**&M0** to AT**&M3**

4 - As **&Q1**

5 - The modem tries to establish a connection with error correction. With S36, the modem can be configured in such a way that an error causes it to be switched off line or to return to a normal asynchronous connection (default).

6 - The modem operates in normal asynchronous mode.

See AT**\N**.

AT**&R** **RTS/CTS control**

This command controls CTS in on line synchronous mode. The operation of CTS is adjusted with hardware flow control.

0 - RTS to CTS is delayed according to the setting of register S26.

1 - In synchronous mode CTS is always on. In asynchronous mode, CTS is on unless flow control by hardware is set (default).

See AT&K.

AT**S** **Read/write S registers**

n=x S register 'n' is set to value 'x'.

n? The value of S register 'n' is read.

The parameter 'n' can be omitted. In this case S0 is selected.

The parameter S can also be omitted. For example:

ATS7 Select S register 7.

AT=40 Set value 40 in the selected S-register.

ATS38 Select S register 38.

ATS=20 Set the value 20 in S register 0.

If a number is entered for ‘n’ for which no S register is present, you will receive the message ERROR. Input and output must always be in decimal numbers. Some S registers are read-only.

AT**&S** **DSR control (Data Set Ready))**

This command is used to set the DSR control of the modem.

0 - DSR always on (default).

1 - DSR is enabled when an answer tone is detected and disabled when the carrier is lost.

AT**T** **Tone dialling (DTMF)**

With this command the modem dials a telephone number using tone dialling. If a different method is stipulated for dialling a telephone number (for example ATDT), pulse dialling will always be used subsequently.

See the ATP command.

AT**&T** **Test and diagnosis**

This command is used to perform a test and diagnosis function according to the specified parameters. If you want to terminate a test, you must first enter the escape codes with the exception of parameters 7 and 8.

0 - End test

1 - Start local analog loopback V54, L3

3 - Start local digital loopback V54, L2

4 - Confirmation of digital loopback for remote request on (default)

5 - Confirmation of digital loopback for remote request off

6 - Request for a remote digital loopback (RDL) V54, L2

7 - Request for a RDL V54, L2 with self-test

AT**V** **Terse/verbose response**

This command sets the response to the terminal to verbose or terse.

0 - Terse (numerical) response

1 - Long (verbose) response (default)

Response table:

SHORT	LONG	n=	0	1	2	3	4
0	OK		*	*	*	*	*
1	CONNECT		*	*	*	*	*
2	RING		*	*	*	*	*
3	NO CARRIER		*	*	*	*	*
4	ERROR		*	*	*	*	*
5	CONNECT 1200		1	*	*	*	*
6	NO DIALTONE		3	3	*	3	*
7	BUSY		3	3	3	*	*
8	NO ANSWER		1	*	*	*	*
9	CONNECT 600		1	*	*	*	*
10	CONNECT 2400		1	*	*	*	*
11	CONNECT 4800		1	*	*	*	*
12	CONNECT 9600		1	*	*	*	*
13	CONNECT 7200		1	*	*	*	*
14	CONNECT 12000		1	*	*	*	*
15	CONNECT 14400		1	*	*	*	*
16	CONNECT 19200		1	*	*	*	*
17	CONNECT 38400		1	*	*	*	*
18	CONNECT 57600		1	*	*	*	*
19	CONNECT 115200		1	*	*	*	*
20	CONNECT 230400		*	*	*	*	*
22	CONNECT 1200TX/75RX		1	*	*	*	*
23	CONNECT 75TX/1200RX		1	*	*	*	*
24	DELAYED		4	4	4	4	*
32	BLACKLISTED		4	4	4	4	*
33	FAX		*	*	*	*	*
35	DATA		*	*	*	*	*
40	CARRIER 300		*	*	*	*	*
44	CARRIER 1200/75		*	*	*	*	*
45	CARRIER 75/1200		*	*	*	*	*
46	CARRIER 1200		*	*	*	*	*
47	CARRIER 2400		*	*	*	*	*
48	CARRIER 4800		*	*	*	*	*
49	CARRIER 7200		*	*	*	*	*
50	CARRIER 9600		*	*	*	*	*
51	CARRIER 12000		*	*	*	*	*
52	CARRIER 14400		*	*	*	*	*
53	CARRIER 16800		*	*	*	*	*
54	CARRIER 19200		*	*	*	*	*
55	CARRIER 21600		*	*	*	*	*
56	CARRIER 24000		*	*	*	*	*
57	CARRIER 26400		*	*	*	*	*
58	CARRIER 28800		*	*	*	*	*

SHORT	LONG	n=	0	1	2	3	4
59	CONNECT 16800		1	*	*	*	*
61	CONNECT 21600		1	*	*	*	*
62	CONNECT 24000		1	*	*	*	*
63	CONNECT 26400		1	*	*	*	*
64	CONNECT 28800		1	*	*	*	*
66	COMPRESSION: CLASS 5		*	*	*	*	*
67	COMPRESSION: V42bis		*	*	*	*	*
69	COMPRESSION: NONE		*	*	*	*	*
76	PROTOCOL: NONE		*	*	*	*	*
77	PROTOCOL: LAPM		*	*	*	*	*
78	CARRIER 31200		*	*	*	*	*
79	CARRIER 33600		*	*	*	*	*
80	PROTOCOL: ALT		*	*	*	*	*
81	PROTOCOL: ALT-CELLULAR		*	*	*	*	*
84	CONNECT 33600		1	*	*	*	*
91	CONNECT 31200		1	*	*	*	*
150	CARRIER 32000		*	*	*	*	*
151	CARRIER 34000		*	*	*	*	*
152	CARRIER 36000		*	*	*	*	*
153	CARRIER 38000		*	*	*	*	*
154	CARRIER 40000		*	*	*	*	*
155	CARRIER 42000		*	*	*	*	*
156	CARRIER 44000		*	*	*	*	*
157	CARRIER 46000		*	*	*	*	*
158	CARRIER 48000		*	*	*	*	*
159	CARRIER 50000		*	*	*	*	*
160	CARRIER 52000		*	*	*	*	*
161	CARRIER 54000		*	*	*	*	*
162	CARRIER 56000		*	*	*	*	*
165	CONNECT 32000		*	*	*	*	*
166	CONNECT 34000		*	*	*	*	*
167	CONNECT 36000		*	*	*	*	*
168	CONNECT 38000		*	*	*	*	*
169	CONNECT 40000		*	*	*	*	*
170	CONNECT 42000		*	*	*	*	*
171	CONNECT 44000		*	*	*	*	*
172	CONNECT 46000		*	*	*	*	*
173	CONNECT 48000		*	*	*	*	*
174	CONNECT 50000		*	*	*	*	*
175	CONNECT 52000		*	*	*	*	*
176	CONNECT 54000		*	*	*	*	*
177	CONNECT 56000		*	*	*	*	*

'*' In a column indicates that the message involved is given when it has been selected with the AT**X<n>** command (n is in the top of the columns). When the column is empty, no message is given at the AT**X** setting involved.

AT**&V** Show connection data

This command provides an overview of the present configuration. The stored settings 0 and 1, the first four stored telephone numbers and the value of the softkey appear on the screen.

AT**&V1** **Display data from last connection**

The AT&V1 command show data about the previous connection.

This is a typical output of the AT&V1 command after a V.90 connection:

```
TERMINATION REASON..... LOCAL REQUEST
LAST TX rate..............  31200 BPS
HIGHEST TX rate.............  31200 BPS
LAST RX rate..............  46667 BPS
HIGHEST RX rate.............  46667 BPS
PROTOCOL................... LAPM
COMPRESSION................ V42Bis
Line QUALITY..............  038
Rx LEVEL....................  013
Highest Rx State............  67
Highest TX State............  67
EQM Sum.....................  00C6
RBS Pattern.................  00
Rate Drop...................  00
Digital Loss................  2000
Local Rtrn Count............  00
Remote Rtrn Count...........  00
V90

OK
```

AT**\V** Number of signal lines for connection

After establishing a connection, the modem can show that the connection has been established on one or more lines.

0 - Message on several lines (default)

1 - Message on one line

The single line connect message format is:

CONNECT <DTEspeed>/<MOD>/<PROT>/<COMP>/<Linespeed>

where:

DTEspeed:	DTE-Modemspeed. Range: 300 – 230400 bps
MOD:	Modulation: V32, V34. MOD is omitted for all other modulations
PROT:	ErrorCorrection: NONE, LAPM, ALT.
COMP:	Compression: NONE, CLASS5, V42BIS
Linespeed:	Speed on the line. Asymmetric speeds are displays separately

Example:

A typical example of a Single line connect message for a V.34 connection is:

CONNECT 115200/V34/LAPM/V42BIS/31200:TX/33600:RX

AT**W** **Extended response**

This command is used to select the information sent after the CONNECT message (see also S95).

0 - The CONNECT message is followed by the terminal speed.

1 - The CONNECT message is followed by the line speed, the error correction protocol and the terminal speed.

2 - The CONNECT message is followed by the line speed (default).

NOTE: The setting of s-register 95 overrides the setting of the ATW command.

AT**&W** **Save configuration**

This command is used to save the current modem settings in memory. Two different sets of settings can be stored.

0 - The settings are saved as set 0

1 - The settings are saved as set 1

See commands AT&Y and ATZ for more information.

AT**X** **Dial and busy tone detection and responses**

This command is used to specify whether only the CONNECT message or the speed too should be displayed. It can also be used to switch off detection of dial and busy tones.

If you want to use dial tone detection when it is switched off, add a 'W' to the telephone number.

0 - dial tone - and busy tone detection off
message: CONNECT

1 - dial tone - and busy tone detection off
message: CONNECT and speed

2 - dial tone detection on, busy tone detection off;
message: CONNECT and speed

3 - dial tone detection off, busy tone detection on;
message: CONNECT and speed

4 - dial tone and busy tone detection on;
message: CONNECT and speed

See overview in ATV command and S95 bit 0.

AT**&X** **Synchronous transmission clock**

Selects the transmission clock in accordance with the given parameter.

0 - Internal clock (default)

1 - External clock. EXT CLK (CT113)

2 - Slave clock, derived from the incoming carrier

AT***X** **Exit remote configuration mode (optional)**

Use this command to exit remote configuration mode.
See paragraph 5.5, *Remote configuration (optional)*.

AT**Y** **Long space disconnect**

This command is used to switch long space disconnect on or off.

0 - Long space disconnect off (default)

1 - Long space disconnect on

In no error correction mode, the modem sends a space of 4 seconds before disconnecting. If the modem receives a space of at least 1.6 seconds, the connection is cleared.

AT**&Y** **Modem configuration after switching on**

This command determines which configuration is to be used when the modem is switched on.

0 - Configurate with stored profile 0 at power-up

1 - Configurate with stored profile 1 at power-up

See the AT&W command.

AT**Z** **Reset and modem configuration**

This command resets the modem through the software and the settings from the specified set are loaded.

0 - Configuration using set 0 settings

1 - Configuration using set 1 settings

See the AT&W command.

AT**&Z** **Save telephone number**

The **TRON DF56.0** supports the storage of a maximum of four telephone numbers in non-volatile memory. The telephone numbers may have a maximum of 40 characters.

AT&Zn=x (n = 0 to 3; x = telephone number).

'+++' **Escape code**

When the modem has established a connection (and is in data mode), it can be switched into command mode. This is done by entering three ASCII characters which are set in register S2 (default is character '+').

There is a time-out period before the first character (pre sequence time), one before the last character (post sequence time) and a timeout period between the characters (inter character time). This time is determined by the value of register S12 (default 1 second).

'**'** **Remote configuration escape code sequence (optional)**

Use this escape sequence to enter the Remote configuration mode of a remote **TRON DF** modem. A password must be entered before any commands can be issued. The '*' is the default escape character, change S202 for a different escape character.

See paragraph 5.5, *Remote configuration (optional)*.

4 S-REGISTERS

This chapter describes the meaning and the contents of the S-registers. Many of these S-registers have a specific technical significance. It is therefore advisable not to alter the contents of an S-register if you do not know what the consequences will be.

A number of S-registers have one meaning (function). Other registers have several functions and are called bit mapped registers. In these registers, commands are set at bit level. Bit-mapped S registers are read-only. The appropriate AT command which controls the relevant bits in the S-register should be used to change the value.

The next section explains what a bitmap register contains. Section 4.2 contains an overview of what each S-register does. The registers marked with * are stored in non-volatile memory.

4.1 Bit Mapped S-registers

In the S-bitmap registers, a function is enabled or disabled. '1' means that the bit is on or set; '0' means that the bit is off or reset. These bits from the binary system represent a decimal value. Bit 7=128, 6=64, 5=32, 4=16, 3=8, 2=4, 1=2 and 0=1. By adding up the decimal values of the bits that are set (1), you obtain the value to be entered in the register.

Bitmap registers are read-only.

4.2 Overview of the S-registers

REG	&W	DEFAULT	RANGE	DESCRIPTION	page
S0	*	000	0-99	Auto-answer	*47*
S1		000	0-255	Ring signal counter	*47*
S2	*	043	0-255	Escape code character	*48*
S3		013	0-127	Carriage return character	*48*
S4		010	0-127	Line feed character	*48*
S5		008	0-255	Backspace character	*48*
S6	*	004	2-255	Maximum wait time for dial tone or blind dialling	*48*
S7	*	060	0-60	Time for carrier	*48*
S8	*	002	0-255	Length of the pause character	*48*
S9	*	006	1-255	Carrier detect time	*48*
S10	*	014	1-255	Carrier 'lost' time	*49*
S11		170	150-255	DTMF tone duration	*49*
S12	*	050	0-255	Timeout escape code	*49*
S13	*	010	1-255	Timer Auto Power Unit (APU)	*49*
S14	*	138		Bitmap register	*49*
S15				Reserved	*50*
S16		000		Bitmap register (test options)	*50*
S17				Reserved	*50*
S18	*	000	0-255	Test Timer	*51*
S19				Reserved	*51*
S20				Reserved	*51*
S21	*	055		Bitmap register	*51*
S22	*	117		Bitmap register	*52*
S23	*	183		Bitmap register	*52*
S24				Reserved	*53*
S25		005	0-255	DTR inactive time	*53*
S26		001	0-255	RTS to CTS active time	*53*
S27	*	009		Bitmap register	*53*
S29	*	011	10-12	Flash Dial Modifier time	*54*

REG	&W	DEFAULT	RANGE	DESCRIPTION	page
S30		000	0-255	Inactivity Timer	*54*
S31	*	194		Bitmap register	*54*
S32		017	0-255	Xon character	*55*
S33		019	0-255	Xoff character	*55*
S36	*	007	0-7	LAPM error detection, line speed limit	*55*
S37	*	000	0-12	Modulation mode	*55*
S38		020	0-255	Off line delay (error corrected modes only)	*56*
S39	*	003	0,3-6	Flow control	*56*
S40	*	105		Bitmap register	*56*
S41	*	131		Bitmap register	*57*
S46	*	138	136,138	Data compression	*58*
S48	*	007	0,7,128	V42 negotiation	*58*
S95	*	033		Extended response	*58*

4.3 Description of the S registers

The S registers are described in this part of the manual. Each register has a specific value. The factory setting is shown in the first line. The registers marked * are stored in non-volatile memory by the command AT&W.

S0 * 000 0-99 Auto-answer

Setting that determines the number of rings before the modem goes on line. Auto-answer is disabled as the default setting. Auto-answer can be switched on, for example with S0=1.

N.B. If you want to enable the modem select option you should give S0 the value 102.

S1 000 0-255 Ring counter

Counts the number of incoming ring signals and places them in this register. 0-255 signals can be recorded. The register is reset when the modem answers the line.

S2 * 043 0-255 Escape code character

ASCII value of the character used as the escape code. The default value is 043, corresponding to the character '+'. If the content of the register is greater than 127, the escape code is disabled.

S3 * 013 0-127 Carriage return character

Specifies the ASCII character to be used as the carriage return character. Carriage return indicates the end of a command line.

S4 010 0-127 Line feed character

Specifies the ASCII character to be used as the line feed character. The line feed comes at the end of a command line after the carriage return.

S5 008 0-255 Backspace character

Specifies the ASCII character to be used as the backspace character. A value greater than 32 disables backspace recognition.

S6 * 006 2-255 Maximum wait time for dial tone or blind dialling.

The value in this register determines the wait time for the dial tone after the modem goes on line. If no dial tone is detected, the modem checks whether blind dialling is set. The same wait time is used if the character ‘W’ is included in the telephone number.

S7 * 060 0-60 Carrier timeout

This register determines how long the modem will wait for a carrier after dialling. This time is a value in seconds.

S8 * 002 0-255 Length of the pause character

The pause character ',' can be used to insert a delay when dialling. This time is a value in seconds.

S9 * 006 1-255 Carrier detect time

A carrier must be detected during the time entered in this register. This time is a value expressed in 1/10 seconds. S9 must always be less than S10.

S10 * 014 1-255 Carrier lost time

A carrier must be lost for the time specified in this register before the modem disconnects. This time is a value expressed in 1/10 seconds. S10 must always be greater than S9.

S11 * 090 65-230 DTMF tone duration

S12 * 050 0-255 Timeout escape code

Specifies the minimum wait time before and after the escape sequence. This time is a value expressed in 1/50 seconds. Default is 1 second.

S13 * 010 1-255 Timer Auto Power Unit (APU)

Bit	Value	Default	Description
Bit 0 - 6	1-255	10	Switch off delay time APU
Bit 7	0-1	0	0= switch off on DTR 1= switch on on CD

S14 * 138 Bitmap register

Bit	Value	Default	Description
Bit 0	-	0	Reserved
Bit 1	0-1	1	0= Echo off (ATE0) 1= Echo on (ATE1)
Bit 2	0-1	0	0= Response on (ATQ0) 1= Response off (ATQ1)
Bit 3	0-1	1	0= Terse response (ATV0) 1= Verbose response (ATV1)
Bit 4	0-1	0	Reserved
Bit 5	0-1	0	0= Tone dialling (ATT) 1= Pulse dialling (ATP)
Bit 6	-	0	Reserved

Bit	Value	Default	Description
Bit 7	0-1	1	0= Answer 1= Originate

S15 **Reserved**

S16 000 **Bitmap register (test options)**

Bit	Value	Default	Description
Bit 0	-	0	Local analog loopback 0= Off 1= On (AT&T1)
Bit 1	0-1	0	Not used
Bit 2	0-1	0	Local digital loopback 0= Off 1= On (AT&T3)
Bit 3	0-1	0	Status remote digital loopback (RDL) 0= Modem not in RDL 1= RDL in operation
Bit 4	0-1	0	Status RDL request 0= no RDL request 1= RDL request (AT&T6)
Bit 5	0-1	0	RDL with self-test 0= Off 1= On (AT&T7)
Bit 6	0-1	0	Local analog loopback (LAL) with self-test 0= Off 1= On (AT&T8)
Bit 7	0-1	0	Reserved

S17 **Reserved**

S18 * 000 0-255 Test Timer

S18 is used to determine how long a test is performed. With a value of 0, the test will be performed continuously. The test can be interrupted by the AT&T0 or ATH commands.

S19 Reserved

S20 Reserved

S21 * 055 Bitmap register

Bit	Value	Default	Description
Bit 0	0-1		1Reserved
Bit 1	0-1	1	0= ATK0 1= ATK1
Bit 2	0-1	1	CTS (CT106) control, synchronous 0= CTS follows RTS (AT&R0) 1= CTS always on (AT&R1)
Bit 3.4	0-3	1	DTR (CT108) control 0= AT&D0 selected 1= AT&D1 selected 2= AT&D2 selected 3= AT&D3 selected
Bit 5	0-1	0	DCD (CT109) control 0= DCD always on (AT&C0) 1= DCD indicates status of carrier (AT&C1)
Bit 6	0-1	0	DSR (CT107) control 0= DSR always on (AT&S0) 1= DSR on after detection of answer tone
Bit 7	0-1	0	Long Space Disconnect 0= ATY0 selected 1= ATY1 selected

S22 * 117 Bitmap register

Bit	Value	Default	Description
Bit 0,1	0-3	1	Loudspeaker volume: 0= Low (ATL0) 1= Low (ATL1) 2= Normal (ATL2) 3= High (ATL3)
Bit 2,3	0-3	1	Loudspeaker on/off 0= Off (ATM0) 1= On during receipt of carrier (ATM1) 2= Always on (ATM2) 3= On while establishing connection (ATM3)
Bit 4,6	0-7	7	Result codes 0= ATX0 selected 4= ATX1 selected 5= ATX2 selected 6= ATX3 selected 7= ATX4 selected
Bit 7	0-1	0	Reserved

S23 * 183 Bitmap register

Bit	Value	Default	Description
Bit 0	0-1	1	RDL setting (remote digital loopback) 0= Not permitted (AT&T5) 1= Permitted (AT&T4)
Bit 1,3	0-7	3	DTE interface speed 0= 0-300 1= 600 2= 12003= 2400 4= 4800

Bit	Value	Default	Description
			5= 9600 6= 19200 7= 38400
Bit 4,5	0-3	3	DTE parity 0= Even 1= Not used 2= Odd 3= None
Bit 6,7	0-2	2	Guard tone 0= Off (AT&G0) 1= Off (AT&G1) 2= 1800 Hz (AT&G2)

S24 Reserved

S25 005 0-255 Inactive DTR time

The modem ignores a disabled DTR (CT108) for a time shorter than the value of this register. The time is expressed in seconds in synchronous mode and 1/100 seconds in other modes.

S26 001 0-255 RTS/CTS control

Delay time between RTS and CTS in synchronous mode. This time is a value expressed in 1/100 seconds.

S27 * 009 Bitmap register

Bit	Value	Default	Description
Bit 0,1	0-3	0	0,0= AT&M0 or AT&Q0 (default)
Bit 3	0-1	3	1,0= AT&M1 or AT&Q1 2,0= AT&M2 or AT&Q2 3,0= AT&M3 or AT&Q3 0,1=At&Q4 1,1= AT&Q5

Bit	Value	Default	Description
			2,1= AT&Q6
Bit 2	0-1	0	Reserved
Bit 4,5	0-2	0	Clock selection 0= Internal clock (AT&X0) 1= External clock (AT&X1) 2= Slave clock (AT&X2)
Bit 6	0-1	0	CCITT/BELL selection 0= CCITT mode (ATB0) 1= BELL mode (ATB1)
Bit 7	-	0	0

S29 011 10-12 Flash Dial Modifier time

Register recall time in 1/10 msec. This setting is used if you include '!' in the dial string (see ATD).

S30 000 0-255 Idle time

S30 contains the time during which the modem remains on line without any activity. A number >0 specifies how many minutes elapse before the line is disconnected. S30=0 means no time limit.

S31 * 194 Bitmap register

Bit	Value	Default	Description
Bit 0	-		Reserved
Bit 1	0-1	1	Automatic line speed detection 0= Off (ATN0) 1= On (ATN1)
Bit 2,3	0-2	0	Error correction messages 0= DTE speed only (ATW0) 1= DTE and DCE speed (ATW1) 3= DCE speed only (ATW2)

Bit	Value	Default	Description
Bit 4,5	-	0	Caller Line Identification (AT#0=no CLI 1=formatted CLI (AT**#CID=1**) 2=unformatted CLI (AT**#CID=2**)CID)
Bit 6-7		-	Reserved

S32 017 0-255 Xon character

S32 contains the character used for Xon flow control.

S33 019 0-255 Xoff character

S33 contains the character used for Xoff flow control.

S36 * 007 0-7 LAPM error logging, line speed restriction

This register determines what happens after establishment of a V42 LAPM connection has failed. (S48=128). (S48=128).

Bit	Value	Default	Description
Bit 0-2	0,1,3,4,5,7	7	0= Disconnect 1= Direct mode connection 3= Normal mode connection 4= MNP connection only 5= MNP connection with fallback to direct mode connection 7= MNP connection with fallback to normal mode connection
Bit 7	0,1	0	Reserved

S37 * 000 0-12 Modulation mode

0	Auto mode	
1-3	300bps	V21 or Bell 103
4	Reserved	
5	1200bps	V22 or Bell 212A
6	2400bps	V22bis

7	1200/75bps	V23
8	4800bps	V32bis or V32
9	9600bps	V32bis or V32
10	12000bps	V32bis
11	14400bps	V32bis
12	7200bps	V32bis

S38 020 0-255 Off line delay (only in modes with error correction)

This setting determines how long it takes before the modem goes off line after a command to disconnect has been issued. This time is used to ensure that the send buffer is empty before the modem disconnects. This time is a value in seconds.

S39 * 003 0,3-6 Flow control

Bit 0-2

0 No flow control (AT&K0)

3 RTS/CTS flow control (AT&K3)

4 Xon/Xoff flow control (AT&K4)

5 Transparent Xon flow control (AT&K5)

6 RTS/CTS and Xon/Xoff flow control (AT&K6)

Bit 3-7 reserved

S40 * 105 Bitmap register

Bit	Value	Default	Description
Bit 0	0-1	0	Extended Services MNP10 0= Conversion from V42 to MNP10 off (AT-K0) 0= Conversion from V42 to MNP10 on (AT-K1)
Bit 1	0-1	0	MNP10 send level adjustment 0= Automatic (AT)M0) 1= Forced adjustment (AT)M1)
Bit 2	0-1	0	MNP negotiation speed 0= Fastest possible speed (AT*H0)

Bit	Value	Default	Description
			1= Negotiate at 1200 bps (AT*H1)
Bit 3-5	0-5	5	Break signal processing 0= AT\K0 1= AT\K1 2= AT\K2 3= AT\K3 4= AT\K4 5= AT\K5
Bit 6-7	0-3	3	MNP block size 0= 64 characters (AT\A0) 1= 128 characters (AT\A1) 2= 192 characters (AT\A2) 3= 256 characters (AT\A3)

S41 * 131 Bitmap register

Bit	Value	Default	Description
Bit 0-1	0-3	3	Compression setting 0= Off (AT%C0) 1= MNP5 (AT%C1) 2= V42bis (AT%C2) 3= MNP5 or V42bis (AT%C3)
Bit 2	0-1	0	Auto-retrain 0= Off (AT%E0) 1= On (AT%E1)
Bit 3	0-1	0	Modem/modem flow control 0= Off (AT\G0) 1= On (AT\G1)
Bit 4	0-1	0	MNP block mode 0= Flow mode (AT\L0) 1= Block mode (AT\L1)
Bit 5-7		4	Reserved

S46 * 138 136,138 Data compression

136 = Data compression on

138 = Data compression off

S48 * 007 0,7,128 V42 negotiation

0 = LAPM connection without negotiation

7 = Negotiation stage (Link Request) on

128 = No negotiation stage, forced fallback as specified in S36

S95 * 033 Extended response

Bit	Value	Default	Description
Bit 0	0-1	1	0= CONNECT and DTE speed 1= CONNECT and line speed
Bit 1	0-1	0	0= CONNECT xxxx 1= CONNECT xxxx /ARQ (in mode with error correction)
Bit 2	0-1	0	0= CONNECT xxxx 1= CARRIER xxxx
Bit 3	0-1	0	0= PROTOCOL message off 1= PROTOCOL message on
Bit 4		0	Reserved
Bit 5	0-1	1	0= COMPRESSION message off 1= COMPRESSION message on
Bit 6		0	Reserved
Bit 7		0	Reserved

See also the response table for the ATV command.

5 SPECIAL APPLICATIONS

This chapter explains what a Speed convertor is, what it can do and how the flow control works in this. Speed convertor and flow control are necessary with an MNP or V42 connection. Error correction and data compression are roughly discussed. The following subjects are also discussed: Remote configuration and Auto- dialback.

5.1 Full Speed adaption

The full speed adaption in the TRON DF56.0 modem causes the data speed to the RS232 connection of the modem to be independent of the data speed of the telephone line.

Communication with the computer now takes place on a fixed baudrate of 230,400 bps at the most, irrespective of the speed of the telephone line. The required communication speed is set with the AT+MS command. During a connection the established line speed can be read from the LED on the front panel of the modem.

The combination of full speed adaption and automatic baudrate selection in the auto answer mode makes is possible to establish a data connection at an arbitrary speed without having to adjust the DTE-speed in the software.

5.2 Automatic flow control

When the modem uses a speed convertor, there is a difference in speed between the serial port and the telephone line. This means that the modem receives data faster than it can send through the telephone line. The information is therefore temporarily stored in a buffer.

There are two ways for a modem to indicate that the computer has to stop sending information for a while because the buffer is in danger of overflowing:

1. By making CTS (Clear To Send) on the RS232C port inactive
2. By means of the Xon/Xoff protocol

The AT&K command can be used to select the flowcontrol options.

This is how CTS/RTS flowcontrol works:

As soon as the buffer is almost full, CTS is made inactive. When the computer recognizes this CTS flow control, it reacts to it by no longer sending data to the modem. When the buffer is empty, CTS is made active and the computer can start sending new bytes to the modem.

The computer can also signal the modem to stop sending data, to do this it uses the RTS signal.

This is how Xon/Xoff flowcontrol functions:

As soon as the modem-buffer reaches a certain limit, the modem sends the Xoff character (in ASCII: ^S) through the serial port to the computer. The computer reacts to this by sending no more bytes to the modem. When the modem-buffer is almost empty, the Xon character (in ASCII: ^Q) is sent to the computer and the computer resumes sending more data.

NOTE: The flow control of the communication software has to be active! Some transmission protocols, such as Xmodem and Zmodem, do not combine properly with the Xon/Xoff flow control. Therefore RTS/CTS is the most commonly used type of flowcontrol.

5.3 Error correction and data compression

When two modems communicate, invalid characters can be received as a result of disturbance on the telephone line.

In order to prevent the reception of wrong information, protocols have been developed which check and, if necessary, correct the information. MNP (Microcom Networking Protocol) and V42 LAPM are protocols that recognise and correct an error. To compensate the speed loss caused by this, there is a possibility to compress the data to be sent. MNP5 and V42bis have a compression technique with which an effective bit speed can be reached which is greater than with a normal connection. This means that with for instance a V34 33,600 connection, a speed higher than 33,600 bps can be attained. MNP5 can compress by a factor 2, so the effective speed can reach a maximum of 67,200 bps.

V42bis can compress by a factor 4, at which a line speed of 134,400 bps can be reached.

NOTE: The speeds mentioned are theoretically reachable speeds. The compression factor mainly depends on the content of the file which is sent. Therefore, a text file can be easily compressed, where data-compression is not very useful on already compressed ZIP, ARJ, or ARC files.

Error-correction and data-compression will not work with FSK-modes such as V21 and V23. To effectively use data-compression it is obvious that the serial port speed has to be high, for instance 115,200 bps.

5.4 User access control and automatic dialback

The TRON DF56.0 modem is equipped with a user access control and an auto-dialback system:

1. The user calling in has to enter a password before the connection is established definitely.
2. The user calling in has to type a password. After this, the modems are disconnected and the user will be called back.

To have auto-dialback working, the following actions must be taken:

1. Programming Entries
2. Activating the auto-dialback
3. Activating the Auto answer

Programming Entries.

An entry consists of a number, password, and possibly a telephone number. There are 100 entries, their numbers range from 0 to 99. The password consists of at least 5 and at most 8 characters. Lower case characters are automatically converted to capitals.

A telephone number is only necessary if the auto-dialback facility is needed. Check the ATD command for allowed telephone number characters. The maximum length for the telephone number is 16 digits.

Use the AT*P command to programme your entries. The colon sign: has to be used to separate the entry number, the password, and the telephone number.

For instance: AT*P67:universe:0W07530,145643
Entry 67 contains password UNIVERSE and telephone number 0W07530,145643.

The AT&W command is not neccesary to store entries in memory! Be sure to check your entries with the AT*Ln command.

Activating Auto-dialback

Auto-dialback is activated using the AT*A command.

NOTE: Note that bit 0 always remains '1'.

Switch on: AT*A1
Switch off: AT*A0

This setting can be stored in permanent memory using AT&W so that auto-dialback is active as soon as the modem is switched on Activating Auto answer

Activating Auto answer

The ATS0=1 command puts the modem in Auto answer mode. The modem goes on-line in answer-mode when there is an incoming call. This setting can be stored in permanent memory with AT&W so that auto-answer is active as soon as the modem is switched on.

After the above mentioned settings, your modem is completely ready for use of the SECURITY CALLBACK.

As soon as the modems establish a connection, the remote modem will ask for a password. The carrier signal is not yet passed on through the serial port because the connection is not yet definite. If entering the password takes longer than 20 seconds, the modems are disconnected. A typing error can be corrected with the backspace key. Three attempts can be made to enter the correct password.

As soon as a correct password has been entered, depending on the entry:

a. The connection will become permanent. The connection is transparent and the carrier signal at the serial port becomes active.

or

b. The modems disconnect. The TRON DF56.0 calls back the telephone number which belongs to the password. The modem which is called back (has to be in

Auto- answer mode!) answers and the connection is established definitely. If the line is busy when calling back or when the modem does not answer, the Tron DF56.0 does not try again.

5.5 Remote configuration (optional)

Remote Configuration means: configurate from a distance. You can use any modem to configurate the TRON DF56.0 modem.

The command to make remote configuration possible is:

ATS80=65 : remote configuration is possible
ATS80=1 : remote configuration not possible

NOTE: Assure that bit 0 always remains '1'.

To make the changes to S80 effective you should reset the modem. This can be done with the ATZ command or by switching the modem off and on again.

In order to avoid others configurating the modem from a distance, this function is protected by a password. The factory setting for the password is: SECRET. We recommend that you change the password before you use remote configuration.

Use the AT*C command to alter the password.

To change the password, the old password must be entered first. After that, the new password must be entered twice. The minimum length for the password is 6 characters, the maximum length is 12.

NOTE: There is no way of asking for the password. It is therefore important to remember it. When you do forget your password, the modem must be returned to Allied Data Technologies.

Call the TRON modem to be configurated (remote) and wait for the CONNECT message.

Type ****

The remote modem recognizes the sequence and asks for the password:

REMOTE PASSWORD:
Type the existing password, a '*' appears for each character.

You should be able to enter AT-commands, as soon as the remote modem verifies the password.

The AT-commands you type will be executed by the remote modem.

End remote configuration with the AT*X command, the modem will exit remote configuration mode. The connection will be transparent again.

The escape character (*=default) can be changed by altering S register 202.

Not all commands can be executed using remote configuration. The following commands are not permitted during remote configuration:

AT\B	AT*P
AT*C	AT&T
AT*L	AT Z
AT O	

5.6 Answer in originate mode

For some applications it is necessary to answer in originate mode. The modem takes up the line and behaves like it has dialled a number. No answer tone will be heard. To activate 'answer in originate' add 128 to S-register 0.

Example: The modem should answer the line in originate mode after two RING signals. The value in S0 should be 2+128=130.

ATS0=130 <CR>
OK

5.7 Modem Select (optional)

The following only applies if your modem is equipped with the Modem Select option.

The Modem Select distinguishes incoming modem and telephone calls by means of an agreed procedure. The first two rings (adjustable with register S0) of a call will be suppressed by the Modem Select. After that, the modem starts to count the seconds until the next incoming RING signal.

-If that RING signal comes within 6 seconds, the modem connects the telephone-line with the telephone. The telephone starts to ring and the call can be answered.
-If it takes longer than 6 seconds before the next RING signal, the modem expects a call from another modem. In practice this means that the calling modem has to dial the number once, disconnect, wait 6 seconds, and then dial the same number again. The second call most be done within 60 seconds.

The Modem Select is activated by giving register S0 the value 102.

S0=102 (bell is suppressed twice).

Save the settings by means of the &W command.

To establish a connection with a Modem Select modem, any TRON modem accepts that you add a 'L' to the telephone number.

For instance: ATD0123-456789L
The L indicates that a connection has to be established with a Modem Select modem. The number is dialled twice.

5.8 Dual Line interface (optional)

The Dual Line interface is an extension for the desk model. With this extension, the TRON DF56.0 can be connected with two telephone lines.

Applications:

a. Auto-dialback. Call in through line 1 and call back through line 2. In some situations this is necessary to guarantee that the first connection is broken off.

APPENDIX A Technical data

General

Speed:	CCITT V21, V22 A/B, V22bis, V23, V32, V32bis, V34, V90, K56Flex, Bell 212A, Bell 103.
	Fax: CCITT V17, V29, V27ter and V21 channel 2
Error correction:	V42 LAPM,MNP2-4 and MNP10
Data compression:	V42bis and MNP5
Command sets:	Extended AT command set including AT+F fax commands
	Class 1 and Class 2 fax commands
Data formats	Data: 7 or 8 bits Parity: odd, even, space, mark, or none Stop bits: 1 or 2

Asynchronous and synchronous mode

Automatic baud detection from 300 to 230.400 bps

CLI detection according to T11-12

Full speed convertor with Xon/Xoff and/or CTS/RTS flow control

Transparent direct mode (11 bits)

Access protection by automatic dialback or access code control

Listening on built-in loudspeaker, volume adjustable

Full diagnosis (V54) with local and remote test loops.

Non-volatile memory for:

4 telephone numbers
Two user settings
Auto-dialback with 100 passwords and corresponding telephone numbers

Serial port CCITT RS232C (V24), 300-230.400 bps

Internal power supply with connection to mains through Euro connector

LEDs for status indication

Programmable Softkey

Ambient conditions

Mains voltage:	230V (50-60Hz/5VA) -15% / +10%
Temperature:	
Operation:	-5°C to +60°C
Storage:	-20°C to +70°C
Humidity:	
Operation:	10% to 75%
Storage:	5% to 95%
Dimensions:	60 x 170 x 160 mm (w x l x h)
Weight:	850 gramms (without cable)

Sender and receiver

Modulation:		
V21, V23 and Bell 103		
V27ter		
V22, V22bis, V29 V32(bis), Bell212A		
V17, V32, V32bis, V34, K56Flex, V90		
PSTN:	CTR21	
Send level:	-11 dBm ± 1 dB (300-3400Hz)	
Receive level:	switch on	> -41 dBm ± 1 dB
	switch off	< -46 dBm ± 1 dB

Impedance and symmetry

Impedance:	according to TBR-21 (300-3400 Hz)
	current-dependent (0 Hz, 16-60 mA)
Earth symmetry:	> 46 dB

Echo damping:	> 20 dB (300-3400 Hz)	
Ring detection:	sensitivity	30 Veff (23-62 Hz)
	connect delay	180 ms
	impedance	> 50 kΩ (300-3400 Hz)
		> 10 MΩ (0 Hz)
	capacity	< 0.1 μF (25 Hz)
Dial tone detection:	sensitivity	60 mV - 2 V (340-550 Hz)
	wait time	5 - 60 seconds
Tone dialling (DTMF):	send level column	-10 dBm ± 1 dB
	send level row	-12 dBm ± 1 dB
	tone length	90 ms ± 5 ms
	pause length	90 ms ± 5 ms
Electrical safety:		Class II

APPENDIX B Website and Bulletin Board

To support users of ADT data communications equipment, Allied Data Technologies has set up a Website on the Internet and a bulletin board system (BBS). You can call these for questions and information. You will also find recent drivers.

Both the Website and the BBS are available 24 hours a day.

Website: http:\\www.allieddata.nl

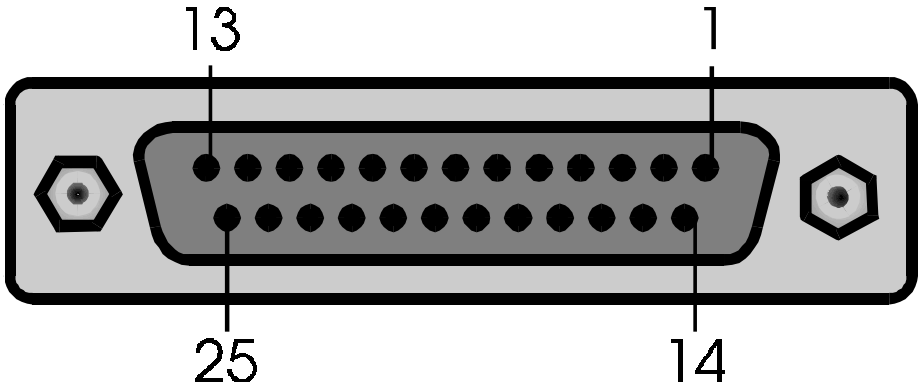
Email: info@allieddata.nl

BBS: (+31) 0181-698399

http:\\www.allieddata.nl

APPENDIX C RS232C connector

CCITT	No.	Direction	Name	Abbreviated	LED
103	**2**	IN	Transmitted Data	(TxD)	TxD
104	**3**	OUT	Received Data	(RxD)	RxD
105	**4**	IN	Request to send	(RTS)	
106	**5**	OUT	Clear to send	(CTS)	
107	**6**	OUT	Data set ready	(DSR)	
102	**7**	-	Signal Ground	(GND)	
109	**8**	OUT	Data carrier detect	(CD)	CD
	9	OUT	+12V (via 1kΩ)		
	10	OUT	-12V (via 1kΩ)		
114	**15**	OUT	Transmit lock		
115	**17**	OUT	Receive lock		
108	**20**	IN	Data terminal ready	(DTR)	DTR
125	**22**	OUT	Ring indicator	(RI)	AA
113	**24**	IN	Transmit lock		



RS232C connector

APPENDIX D ASCII table

Meaning of the ASCII codes

NUL	Null, or all zeros	**DC1**	Device Control 1	**SI**	Shift In
SOH	Start of Heading	**DC2**	Device Control 2	**SO**	Shift Out
STX	Start of Text	**DC3**	Device Control 3	**SYN**	Sync.
ETX	End of Text	**DC4**	Device Control 4	**LF**	Line feed
EOT	End of Transmission	**CAN**	Cancel	**FF**	Form feed
ACK	Acknowledge	**EM**	End of Medium	**ENQ**	Enquiry
BEL	Bell or Alarm	**SUB**	Substitute	**ESC**	Escape
BS	Backspace	**FS**	File Separator	**DLE**	Data Link
HT	Horizontal Tab	**GS**	Group Separator	**ESC**	Escape
VT	Vertical Tab	**RS**	Record Separator	**SP**	Space
CR	Carriage Return	**US**	Unit Separator	**DEL**	Delete
NAK	Negative Acknowledge	**ETB**	End Transmis. Block		

The ASCII codes and ASCII control codes, their names, decimal and hexadecimal formats:

CTRL	CODE	DEC	HEX	CODE	DEC	HEX	CODE	DEC	HEX
@	NUL	0	00	+	43	2B	V	86	56
A	SOH	1	01	,	44	2C	W	87	57
B	STX	2	02	-	45	2D	X	88	58
C	ETX	3	03	.	46	2E	Y	89	59
D	EOT	4	04	/	47	2F	Z	90	5A
E	ENQ	5	05	0	48	30	[	91	5B
F	ACK	6	06	1	49	31	\	92	5C
G	BEL	7	07	2	50	32	]	93	5D
H	BS	8	08	3	51	33	^	94	5E
I	HT	9	09	4	52	34	_	95	5F
J	LF	10	0A	5	53	35	`	96	60
K	VT	11	0B	6	54	36	a	97	61
L	FF	12	0C	7	55	37	b	98	62
M	CR	13	0D	8	56	38	c	99	63
N	SO	14	0E	9	57	39	d	100	64
O	SI	15	0F	:	58	3A	e	101	65
P	DLE	16	10	;	59	3B	f	102	66
Q	DC1	17	11	<	60	3C	g	103	67
R	DC2	18	12	=	61	3D	h	104	68
S	DC3	19	13	>	62	3E	i	105	69
T	DC4	20	14	?	63	3F	j	106	6A
U	NAK	21	15	@	64	40	k	107	6B
V	SYN	22	16	A	65	41	l	108	6C
W	ETB	23	17	B	66	42	m	109	6D
X	CAN	24	18	C	67	43	n	110	6E
Y	EM	25	19	D	68	44	o	111	6F
Z	SUB	26	1A	E	69	45	p	112	70
[	ESC	27	1B	F	70	46	q	113	71
	FS	28	1C	G	71	47	r	114	72
]	GS	29	1D	H	72	48	s	115	73
	RS	30	1E	I	73	49	t	116	74
-	US	31	1F	J	74	4A	u	117	75
	SP	32	20	K	75	4B	v	118	76
	!	33	21	L	76	4C	w	119	77
	"	34	22	M	77	4D	x	120	78
	#	35	23	N	78	4E	y	121	79
	$	36	24	O	79	4F	z	122	7A
	%	37	25	P	80	50	{	123	7B
	&	38	26	Q	81	51	|	124	7C
	'	39	27	R	82	52	}	125	7D
	(	40	28	S	83	53	~	126	7E
	)	41	29	T	84	54	DEL	127	7F
	*	42	2A	U	85	55			

APPENDIX E BIBLIOGRAPHY

Many publications have appeared on the subject of modems and other aspects of data communications. They include books, articles in computer magazines as well as specialist data communications magazines. A good book shop will be able to provide more information.

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